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Title-

Seasonal Changes in Phytoplankton community in different ponds of Bilaspur Region Along with Physico-Chemical Characteristics of water.

Introduction

Earth is the ‘watery Planet’ viewed from space. It is predominantly blue as 74% of its surface covered by water oceans contain 97% on the earth water while the remaining 3% is classified as fresh water, 77% of this surface is stored as ice & 22% as ground water & soil moisture. The remaining fresh water making up less than 1% of world total, is contained in lakes, rivers; ponds & wetlands. Water has many purpose throughout the world, beside from human consumption & purposes related to that with 70% of the earth surface is covered with water, it makes water the most common substance on earth. There are 326 million cubic miles of water on earth.

Water is a natural solvent & has a proper quality of dissolving & carrying cute n solution. The chemical composition of natural water is derived from different sources of solute including gases & aerosols from atmosphere, weathering & erosions of rocks & soils, solution & precipitation reaction occurring below, land surface & from cultural effect relating from human activities. In this process it gets contaminated problem posed by elevated concentration of toxic metals in aquatic environment are hazardous to human health as well as to plants & animals. Thus, the term quality encompasses physical, chemical & biological characteristics of water. The quality is a major factor in determining the usefulness of any water supply to meet the requirement of proposes usage i.e. for domestic, agricultural or industrial.

The maintenance of healthy aquatic ecosystem is depends on the physicochemical properties of water and the biological diversity. A large number of streams and rivers in India have been impound to store the water

for multipurpose beneficial uses like irrigation, fisheries, power generation and drinking water supply.

The main purpose of analysis physical, chemical and microbiological characteristics of water is to determine its nutrient status. Since the water contains dissolved and suspended material in various properties, its physical and chemical characteristics. The water quality is also affected by pollutant which act on elements existing in water such as ammonia, nitrate etc. It is not possible to understand biological phenomena fully without the knowledge of water chemistry.

Phytoplankton are ubiquitous component of the algal species near the water surface of freshwater lakes. They have often been considered the indicator of water quality. Phytoplankton species are photosynthetic and are grazed upon by zooplankton and other aquatic organisms. Phytoplankton occur in unicellular, colonial and filamentous forms and because of their short life-cycle respond quickly to light fluctuation in the physical-chemical environment, resulting in altered population abundance and species composition in the water surface in which they found and plays an important role in maintaining the ecology and water quality of freshwater ecosystem.

The aim of this research is to carryout an ecological survey of the phytoplankton, investigation of species composition and density in relation to environmental parameters as Temperature, pH, Dissolved oxygen, Biological oxygen demand, Nitrate, Phosphate etc.

Study Site –

1. Bandhwa Pond (Kota)
2. Jora Talab (Sarkanda)
3. Jatiya Talab (Jarhabhata)
4. Mahamay Talab (Tifra)
5. Ghikund Talab (Mopka)

Objective of proposal work –

1. Study the availability of phytoplankton and their Ecological survey
2. Study the seasonal variation.
3. Study the different physico-chemical character of water in respect to their effect on phytoplankton.
4. Comparative study of phytoplankton community in different pond of Bilaspur region.

Brief Review of work

In the field of physico—chemical condition & phytoplankton population of water, a number of researchers published data on fresh water ecology. The important are Simp-son (1949) worked on measurement of diversity. Rawson (1956) worked on Algae indicator of tropical lake type. Philipose(1960) work on fresh water phytoplanktons of island fisheries .Howker (1963) work on the ecology of waste water treatment. Richard (1966) worked on environmental hazard of water pollution. Palmer (1969) work on algae tolerating organic compound.

In 1973, Bennett and David worked on the nitrogen cycle sediment water system. Robert, Ever and Robert (1974) worked on phytoplankton distribution and water quality of colorodo river.Precotte (1975) worked on the algae of western great lakes. Golteman (1975) worked on river ecology. Vashisht and Sharma (1975) worked on ecology of a typical urban pond of Ambala city of Haryana state. Rao (1978) worked on ecological study of three fresh water ponds of Hydrabad. Khan and Siddiqui (1977) worked on seasonal changes in limnology of perennial fresh pond of Aligarh.

Das and Upadhyay (1979) studies on qualitative and quantative fluctuations of plankton in two lakes Nainitaal and Bhimtaal . Shankaran (1982) worked on imnological studies on Sampa Reservior of Betul. Trevedi and Goel (1986) worked on chemical and biological method for water pollution. Singh (1990) studied the high altitude limnology and its scope in India. Tiwari (1992) worked on the pollution of Hussain Sager lake of Hydrabad .Sabata and Nayer (1995) worked on River pollution. in India.

Verma and Mohanty (1995) worked on physico-chemical parameters of Darimukundpur pond.

Anand (1998) worked on Indian fresh water algae. Govindsamay,Kannan and Azariah (2000) studied the physico-chemical properties and primary production of coastal water biotopes of coromandel coast of India. Sadguru Prakash (2001) worked on planktons of fresh water body of Balrampur. Chitra and Meera (2004) studied the flora of temporary water bodies along the semi coastal line Chackai toshan1gumugharn in Tiruvananthapuram. Harsha and Mallammanavar (2004) worked on phytoplankton density in Gopalswami pond of

Karnataka. Chattopadhyay and Banerjee (2007) studied the diversity of net Dhytoplankton in lake Krishnasagar. Agarwal and Rajwar (2010) worked on Tehri Dam Reservior of Himalaya. Siddamallayya and Pramita (2011) worked on phytoplankton community of Papnash pond of Karnataka.

Proposed Methodology –

Study of phytoplankton population-

The phytoplankton population samples will collected monthly from different site of pond surface. The phytoplankton samples will collected by plankton net of No.20 silk bolting cloth (mesh size 0.076mm) and will transfer into the glass bottle and preserve in 1% formaline solution . The identification of phytoplankton, will on the basis of their morphological feature upto the level of species according to literature in the laboratory.

Pond water sampling-

Water samples will collected monthly from the pond for the physical-chemical analysis in the 2 litre plastic bottle before 9 am. Some physico-chemical parameter will study on the spot and others in the laboratory according to American Public Health Association (APHA), American Water Association (AWWA), and Water Pollution Control Federation (WPCF).

The parameters are-

(a) Temperature-by centigrade thermometer.

(b) Turbidity-by turbidity meter.

(c) Conductivity-by conductivity meter.

(d) Hydrogen ion concentration (pH)-by pH meter.

(e) Free carbon dioxide-by titrimetric method. 100 ml sample titrate with 0.1 N NaOH Solution + phenolphthalein indicator

$$\text{Free } CO_2 = \frac{A \times B \times 44000}{ml\ sample}$$

A = ml titrant

B = Normality of Titrant

(f) Dissolved oxygen (DO)-by Winkler modified method. 300 ml sample in BOD bottle + 2 ml. Maganese sulphate + 2 ml. Alkali-iodide-azide reagent $\rightarrow$ shake bottle of 15 mint., ppt appear + 2 ml. conc. H_2SO_4 $\rightarrow$ ppt dissolve. Then this 100 ml. solution titrant with 0.025 N. Sodiumthiosulphate. With starch indicator.

$$DO = \frac{A \times N \times 8 \times 1000}{V_1 - V_2}$$

A = ml titrant used

B = Normality of Titrant

V_1 = ml of sample

V = ml of $MnSO_4$ + alkali iodide azide

(g) Biological oxygen demand (BOD)-by Winkler modified method.

Initial D.O. – final D.O. (After 3 days 27^0C)

(h) Chloride-by Mohr's method.

100 ml. sample titrant with silver nitrate using potassium chromate as indicator.

$$Cl = \frac{(A - B) \times N \times 33.45 \times 100}{ml\ \ sample}$$

A = ml titrant used for sample

B = ml titrant using for blank

N = Normality of titrant

(i) Alkalinity-by titrimetric method

200 ml. sample titrant with 0.1 N HCl with methyl orange indicator.

$$\text{Alkalinity} = \frac{A \times B \times 50000}{ml\ sample}$$

A = ml titrant

B = Normality of titrant

(j) Hardness-by EDTA titrimetric method.

100 ml. sample + 5 ml. buffer solution titrant with 0.01 M. EDTA using eriochrome black T indicator.

$$\text{Total Hardness} = \frac{ml\ EDTA\ used \times 100}{ml\ sample}$$

(k) Calcium Hardness –

EDTA Method using murexide indicator. 100 ml sample + 5 ml. NaOH of 1 N. Solution titrant against EDTA of 0.01 M. using murexide.

$$\text{Calcium Hardness} = \frac{ml\ of\ titrant \times 1000 \times 1.05}{ml\ sample}$$

(l) Magnesium hardness- = Total Hardness – Calcium Hardness x 0.245.

(m) Nitrogen Nitrate = phenol di-sulphonic method 25 ml sample evaporated to dryness over electronic hot plate. Residue dissolve in 2 ml. phynol di-sulphonic acid + 3.5 amonia solution $\rightarrow$ yellow colour appear measure with the help of digital spectro photometer.

$$NO_3 - N\ mg.l^{-1} = \frac{\mu g.NO_3 - N}{ml\ sample}$$

(n) Phosphate :- Chlorostanous duced molyb di-phosphoric blue color method.

(a) 25 ml. sample + 2 ml. strong acid (HNO_3 + 1 H_2SO_4) + Heated till 1 ml.

(b) sample Cool + 5 ml. distil water + 1 drop phenolphthalein indicator. + 1 N. NaOH $\rightarrow$ faint pink color appear.

(c) this 25 ml. solution + 2 ml. sulphomolybdic acid solution + 3 drop chlorostanous acid $\rightarrow$ blue color appear measured by spectrophoto meter.

$$Phosphate = \frac{mg.p \times 1000}{ml\ \ sample}$$

The expected outcome from the work-

The expected outcome from this work will be the result of different value of physicochemical parameters in these ponds of Chhattisgarh and from this result, we will get which pond is more polluted and which parameters are more effective in creating pollution in pond water.

We will also get the result of the ecological survey of different types of phytoplankton in different month and how the phytoplankton community effected by the physico-chernical parameters.

We will also point out how we can manage the physico-chemical parameters to restore the quality of water and water body to develop the pond water for other uses like fishery, agriculture etc.

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